

REMARKS/ARGUMENTS

The specification has been amended on several pages to update the status of the cited patent applications. No new matter is presented with these amendments.

In addition, pages 18, 20, 33, 34, 38, 43, 67-70, 72-77, and 79-83 have been amended to make a technical correction. Phosphor P-4 or $\text{BaMgAl}_{11}\text{O}_{19}:\text{Ce}$ has been relabeled as “comparison” phosphor CP-3 because it is not within the phosphor definition of original Claim 1. Thus, the text in the examples in which P-4 is mentioned has been amended to refer to “CP-3”. No changes have been made to the text with respect to the photothermographic formulations or test results. These changes should be acceptable because they are clearly correcting an obvious technical error that Applicants discovered just recently upon another review of the present application.

Claim 3 has been amended to add the two more preferred phosphor classes as described in original Claim 1. Claim 9 has been amended to delete P-4 (now CP-3) because it is not within the scope of original Claim 1.

Applicants are providing a copy of pages 237-274 (Chapter 34, “Chemistry and Physics of R-Activated Phosphors” by G. Blasse) of the Handbook on Physics and Chemistry of Rare Earths, Vol. 4- Non-Metallic Compound –II, Gschneider, Jr. and Eyring, Eds., Elsevier Science Publishing, 1979. This published information is referred to in Applicants’ arguments below. This text is an authoritative treatise on rare earth phosphors to which class Applicants’ phosphors belong. This reference is hereinafter referred to as “Blasse”.

Rejection Under 35 U.S.C. §103

Claims 1-25 have been rejected as being unpatentable over the combination of U.S. Patent 6,440,649 (Simpson et al.), U.S. Patent 3,431,215 (Chenot et al.), and the publication by Gilliland et al., *Electrochemical Technology*, 1966, 4(7-8), pp. 378-383. As far as it applies to claims presently in this application, this rejection is respectfully traversed.

The Office Action alleges that Simpson et al. describes every aspect of Applicants’ claimed invention except the recited phosphor that emits in

the range of from about 100 to about 410 nm. It is argued that Simpson et al, however, mentions the general emission of phosphors in the “ultraviolet, visible, or infrared region” (Col. 9, lines 18ff) and notes the UV-sensitive photothermographic formulation shown in Example 2.

Chenot et al. and Gilliland et al. are cited for their teaching of UV-emitting phosphors. It is then argued that it would be obvious for a skilled artisan to use the phosphor of the secondary references in the photothermographic materials of Simpson et al. to increase photographic speed.

Applicants disagree with this leap in logic and provide their reasons below after a brief explanation of the presently claimed invention.

Applicants’ Invention:

As pointed out in more detail in the present application, workers in the field of photothermography are continually looking for ways to increase photographic speed without an increase in D_{min} and poorer image contrast. This has been the effort of numerous researchers in the field for years and many solutions to this problem have been proposed and some have been adopted in commercial films.

However, Applicants unexpectedly found that a unique class of phosphors, namely rare earth phosphates, yttrium phosphates, strontium phosphates, and strontium fluoroborates that are X-radiation sensitive and emit radiation in the range of from about 100 to about 410 nm (i.e. essentially UV-emitting phosphors of these classes). Nothing in the photothermographic literature of which Applicants are aware would have suggested this approach to speed enhancement. While phosphors have been used in the past in photothermographic materials (e.g. Simpson et al.), none of those phosphors are both sensitive to X-radiation and capable of emitting in the UV region of the electromagnetic spectrum and Applicants had no previous hint that certain classes of UV-emitting phosphors also be sensitive to X-radiation and further would provide the demonstrated improvements.

Rebuttal of the Rejection:

Applicants respectfully traverse the unpatentability rejection for at least two reasons: (1) Chenot et al. and Gilliland et al. are non-analogous art and thus improperly combined with Simpson et al. against the presently claimed

invention; and (2) even if combined, the three cited references fails to teach or suggest the claimed invention because there is no motivation to combine all of the claimed features, i.e. it is an improper “picking and choosing” of specific features without motivation in the art itself for making the combination.

Chenot et al. and Gilliland et al. are non-analogous art.

In order for a reference to be “analogous” prior art, the reference must be in the field of Applicants’ endeavor or, if not, then be reasonably pertinent to the particular problem with which the Applicants are concerned, *In re Oetiker* 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992) and *In re Deminski* 230 U.S.P.Q. 313 (Fed. Cir. 1986). The Court has also said that a reference can be “analogous” art if “it is one which, because of the matter with which it deals, logically would have commended itself to an inventor’s attention in considering his problem”, *Wang Laboratories Inv. v. Toshiba Corp.* 26 U.S.P.Q.2d 1767 (Fed. Cir. 1993).

These two reference clearly fail the first test because they are not even remotely related to photothermography or to any imaging art. Chenot et al. clearly points to the use of the UV-emitting phosphors in “high pressure electric discharge devices and cathode ray tubes” (Abstract). It is difficult for Applicants to see any connection between photothermographic materials and cathode ray tubes or display devices. The Examiner had to go far afield in an unrelated class of art to find Chenot et al.

Gilliland et al. was cited by Applicants, not because they consider it pertinent to the claimed invention, but merely to comply with their duty under 37 C.F.R. 1.97-1.99. Applicants discovered this publication in a general search of all literature directed to UV-emitting phosphors. Yet, a teaching merely about UV-emitting phosphors does not make the reference pertinent to photothermography. Gilliland et al. itself clearly points out that it is relevant to phosphor screens for CRT devices and various imaging devices. This is clearly irrelevant to photothermography. No admission by Applicants or logical argument by the Examiner has shown how it is relevant to the present invention.

They also fail the second critical test. Since they are not even remotely related to photothermography, they fail to appreciate any problems associated with photothermography such as poor photographic speed. Chenot et al. is directed to the need for UV-emitting phosphors having a higher emission in

a narrower emission range so that the amount of the phosphor can be “closely controlled” (Col. 1, lines 52-54). Gilliland et al. is merely directed to a literature survey of UV-emitting phosphors. Nothing can be learned from this compendium of publications about increasing photographic speed in photothermographic materials.

Chenot et al. describes one class of phosphors useful in the present invention, but fails to suggest their use outside of the conventional cathode ray tubes or display devices. Applicants would also point out that none of the phosphors described in Gilliland et al. are within the classes of compounds recited in Applicants’ claims. That is, this reference fails to teach or suggest rare earth phosphates, yttrium phosphates, strontium phosphates, and strontium fluoroborates. Gilliland et al. is even less relevant than Chenot et al. Hence, a skilled worker would not consider either Chenot et al. or Gilliland et al. “reasonably pertinent” since they have nothing to say about the problem that Applicants have addressed with the present invention that is in the field of photothermography.

Thus, the combination of Simpson et al. with Chenot et al. and Gilliland et al. is improper and the rejection should be withdrawn because Simpson et al. alone cannot support an unpatentability rejection.

Even if the three references could conceivably be considered as properly combined, they fail to teach or suggest Applicants’ claimed invention because of the unpredictability inherent in choosing phosphors of any type for increasing speed in photothermographic materials, as well as the unpredictability inherent in choosing rare earth “lamp” phosphors for this purpose.

Applicants would like to explain an important understanding about phosphors, and particularly UV-emitting or “lamp” phosphors. It is well understood in the art (e.g. the “Blasse” publication cited above) that not every UV-emitting rare earth phosphor is necessarily excitable by X-radiation.

Due to the complexities of the mechanism of X-ray excited luminescence, those skilled in the art recognize that it is difficult at best to determine whether a rare earth “lamp” phosphor (i.e. a UV-emitting rare earth phosphor) will exhibit X-ray excited luminescence, primarily due to wide difference in excitation energy. For instance, the UV excitation energy employed with rare earth “lamp” phosphors is between 2.5 and 7 eV. The excitation energy

employed for X-ray imaging is between 15 keV to 20 MeV for the common range for mammography to radiation therapy. The difference in excitation energies is equivalent to at least 3 orders of magnitude.

UV-emitting rare earth phosphors depend on two main characteristics for their efficiencies: 1) the optical absorption cross section of the phosphor for the optical excitation and 2) the lattice energy transfer mechanism to the emitting center. X-ray excitable phosphors do not depend on the same characteristics for their efficiency. Rather, X-ray phosphors depend on 1) the mass absorption cross section for highly ionizing radiation (X-radiation), 2) the efficiency of the energy transfer of the auger cascade that results from an absorption event to the lattice, and 3) the lattice energy transfer mechanism to the emitting center. Those skilled in the art of rare earth “lamp” and X-ray phosphors recognize that different absorption cross-sections are involved for the light emission by the phosphors. Those skilled in the art also recognize that the second step in the mechanism of luminescence using x-ray excitation has not been modelled and is poorly understood.

Hence, the following statements that are found on page 272 of the cited “Blasse” publication:

"5.3. Interest in X-ray phosphors is still increasing during recent years (see e.g. the Proceeding of the Electrochemical Society Spring Meeting 1977 in Philadelphia). It is still uncertain which materials will prove the most feasible ones for certain applications, but the rare earth ions will certainly be used in it."

Despite the passage of 25 years, there remained an uncertainty as to which UV-emitting rare earth phosphors would be feasible for excitation by X-radiation until Applicants made their discovery with the present invention. They found certain “lamp” phosphors that are both UV-emitters and excitable by X-radiation.

Both UV-emission and excitation by X-radiation are required for the phosphors in the presently invention. The inherent unpredictability of what compounds will have both properties is the reason why the common “lamp” phosphors described for example in Chenot et al. and Gilliland et al. were not known for use in radiography until Applicants found their usefulness. That is, there is no suggestion provided in the cited art that the UV-emitting phosphors are also excitable with X-radiation. “Lamp” phosphors are commonly known by this

name because of their typical utility in lights, cathode ray tubes, and other illuminated display devices. They are not known for radiographic purposes.

The phosphors useful in the present invention are specific classes of compounds that are both UV-emitting and excitable by X-radiation. As suggested by the “Blasse” publication, it is not predictable as to which phosphors will have both of these required properties, and especially not from the cited literature (i.e. Chenot et al. and Gilliland et al.). Thus, it is unpredictable as to which phosphors can be used in the practice of the present invention.

It follows from these arguments that the combination of the three cited references is merely an improper “picking and choosing” of specific features without motivation in the art itself for making the combination. Citing references relating to isolated aspects of a claimed invention is an insufficient basis or approach for concluding that a combination of features would be obvious, *Ex parte Hiyamizu* 10 USPQ2 1393 (BPAI, 1988). A proper combination of references requires some incentive in the references themselves to make the combination *In re Fritsch* 23 USPQ2 1780 (CAFC 1992).

Simpson et al. is clearly directed to the same art as the presently claimed invention. However, as pointed out above, Chenot et al. and Gilliland et al. are clearly not. Nothing in those references has any hint of photothermography or the problems addressed by the present invention, and as a result the Office Action has failed to point out any teaching that would motivate a skilled artisan to make the combination that the Examiner has made. The reason is that incentive or motivation to do so is lacking in the prior art as required by the Patent Statute. Gilliland et al. even fails to mention any of Applicants’ classes of UV-emitting phosphors. A combination of Chenot et al. and Gilliland et al. with Simpson et al. can only be made by “hindsight”, i.e. it is motivated only by Applicants’ own teaching about the usefulness of phosphors that are both UV-emitting and X-radiation sensitive in photothermographic materials. As a result, while the Examiner found most of Applicants’ features in Simpson et al., it was only at Applicants’ suggestion in the present application that he found the missing features in the non-analogous art Chenot et al. (not in Gilliland et al. as pointed out above). This is clearly an improper approach to support a *prima facie* case for unpatentability under Section 103.

Thus, the unpatentability rejection of Claims 1-25 is improper and should be withdrawn.

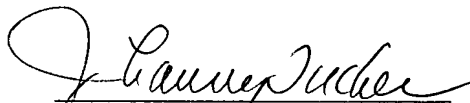
Obviousness-Type Double Patenting Rejection

Claims 1-25 have also been rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1-17 of copending U.S. Serial No. 10/826,780 (Simpson et al.). As far as it applies to claims presently in this application, this rejection is traversed.

However, in order to expedite prosecution, a Terminal Disclaimer is provided with this response to overcome the rejection.

In view of the foregoing amendments and remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the examiner is earnestly solicited.

Respectfully submitted,


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If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.